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(दूसरा पुनरीक्षण)

Indian Standard

CODE OF PRACTICE FOR INSPECTION OF LOW PRESSURE WELDED STEEL GAS CYLINDERS OTHER THAN LPG CYLINDERS IN USE

(Second Revision)

UDC 621·642·02 : 620·111·1 : 006·76

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

March 1993 **Price Group 2**

Gas Cylinders Sectional Committee, HMD 16

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Gas Cylinders Sectional Committee had been approved by the Heavy Mechanical Engineering Division Council.

This standard was originally issued in 1970 and subsequently revised in 1984. In this revision some of the definitions and limits are modified. Tare weight verification and thread inspection are included. LPG cylinders are excluded from the scope.

The Gas Cylinders Rules, 1981 of the Government of India require that a cylinder be condemned when it leaks at places other than weld or when internal or external corrosion, denting bulging, or evidence of rough usage exists to the extent that the cylinder is likely to be weakened appreciably.

This standard has been prepared as a guide to cylinder users and fillers for establishing their own cylinder inspection procedures and standards. It is of necessity general in nature although some specific limits are recommended. It should be distinctly understood that it will not cover all circumstances for each individual cylinder type. Each cylinder user is expected to modify them to suit his own cylinder design or the conditions of use that may exist in his own service. Rejection, or acceptance for continued use in accordance with their cylinders are or are not dangerous or subject to impending failure, but represents practice which has been satisfactory to a cross section of the industry.

Experience in the inspection of cylinders is an important factor in determining the acceptability of a given cylinder for continued service. Users lacking this experience and having doubtful cylinders should return them to a manufacturer of the same type of cylinders for reinspection.

In the preparation of this standard, considerable assistance has been derived from the following standards:

CGA-C6-1955 'Visual inspection of compressed gas cylinders' issued by Compressed Gas Association, U. S. A.; and

AS : CB 22 : 1969 Code for requirements of test station for the inspection and testing of gas cylinders. Standards Association of Australia.

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

CODE OF PRACTICE FOR INSPECTION OF LOW PRESSURE WELDED STEEL GAS CYLINDERS OTHER THAN LPG CYLINDERS IN USE

(Second Revision)

1 SCOPE

This standard covers the measurement of various external and internal defects by inspection and the limiting criteria for the acceptance of low-pressure welded steel gas other than LPG cylinders in use marked with a working pressure less than 3 430 kPa (35 kgf/cm^2) on the basis of extent of defects revealed by inspection.

1.1 The limiting criteria for high pressure acetylene gas cylinders and LPG cylinders in use are covered by the following Indian Standards:

IS 8433 : 1984 Code of practice for visual inspection of dissolved acetylene gas cylinders (*first revision*)

IS 8451 : 1984 Code of practice for visual inspection of high pressure gas cylinders (*first revision*)

IS 13258 : 1991 Welded low carbon steel gas cylinders exceeding 5 litre water capacity for low pressure liquefiable gas — Code of practice for inspection and reconditioning of used LPG cylinders

2 REFERENCES

The Indian Standards listed below are necessary adjuncts to this standard:

IS No.	*Title*
7241 : 1981	Glossary of terms used in gas cylinder technology (*first revision*)
9200 : 1988	Method of disposals of unserviceable compressed gas cylinders (*first revision*)

3 TERMINOLOGY

3.1 For the purpose of this standard, the definitions given in IS 7241 : 1981 shall apply. In addition the following definitions shall also apply.

3.2 Bulge

Swelling of the cylinder wall.

3.3 Burn

Isolated heat-affected sections of the cylinder wall caused by electric arc or high temperature flame impingement (for example, oxy-acetylene flame).

3.4 Cut (Gouge)

A sharp impression where the metal has been removed or redistributed.

3.5 Dent

A blunt depression where the surface material has not been penetrated.

3.6 Dig

A sharp depression where the surface material has been penetrated.

3.7 Fire

Damage to the cylinder as a result of fire.

3.8 Gas Leakage

Gas escaping through the cylinder.

3.9 General Corrosion

Corrosion more extensive than pit or line corrosion.

3.10 Line Corrosion

Corrosion in a line, often at a junction with an attachment (for example, footring) not greater than 6 mm wide at the surface.

3.11 Pit

Local corrosion not in excess of 6 mm diameter and occurring not more frequently than one in any 500 mm^2 of the surface.

4 INSPECTION EQUIPMENT AND METHOD OF MEASUREMENT

Exterior corrosion, denting, bulging, gouges or digs are normally measured by simple direct measurement with scales or depth gauges. The defect can also be measured using a rigid straight edge of sufficient length placed over the defect and a scale is used to measure the distance from the bottom of the straight edge to the bottom of the defect. Suitable depth gauges may also be used for measuring the depth of small cuts or pits. It is important when measuring such defects to use a scale which spans the entire affected area. When measuring cuts, the upset metal should be removed or compensated for so that only actual depth of metal removed from the cylinder wall is measured.

5 EXTERNAL EXAMINATION

Cylinders shall be examined externally for rust, scale, damage and other physical defects. Protective paint, plating or other coatings and foreign matter shall be removed where necessary from the external surface of the cylinder so that the surface can be properly examined. In determining the condition of the cylinder the examiner shall take into consideration its length of service and the minimum wall thickness required by the specification to which the cylinder was made. The limits shown in **6** shall be used in assessing defects and the conditions which necessitate declaring the cylinders unserviceable.

6 MEASUREMENT OF DEFECT AND CRITERIA FOR DECLARING A CYLINDER UNSERVICEABLE

6.1 Bulge

Cylinders shall be declared unserviceable when a variation of one percent or more exists in the measured circumferences or in peripheral distances measured from the valve pad to the centre seam (or equivalent fixed point) according to **6.1.1**.

6.1.1 *Measurement of Bulges*

Bulges in cylinders shall be measured by any of the following ways:

a) Bulges on the cylinder sidewall can be measured by comparing a series of circumferential measurements.

b) Bulges in the head and in some cases on the sidewall, can be measured by comparing a series of measurements or the peripheral distance between the valve pad and centre seam (if any) or an, equivalent fixed location on the cylinder sidewall.

c) Variations from normal cylinder contour can be measured directly by either measuring the height of bulge with a scale or comparing templates of bulged areas with similar areas not bulged.

6.2 Burn

Cylinders having burns shall be declared unserviceable.

6.3 Dent

Cylinders shall be declared unserviceable when the depth of a dent is greater than one-tenth of the mean diameter of the dent or the mean diameter of the dent is greater than one-quarter of the diameter of the cylinder. Dent on a weld shall not be permitted, but flattening (wear) of weld shall not be treated as a dent on the weld. Dent adjacent to the flattened weld shall be treated as a dent on the weld.

6.4 Dig

Cylinders shall be declared unserviceable when a dig on a cylinder body is 75 mm or more in length and the depth of the dig is more than 4 mm.

6.5 Cut

Cylinders shall be declared unserviceable when a cut on a cylinder body is 75 mm or more in length.

6.6 Pit

Cylinders having pit shall be declared unserviceable if the wall thickness under a pit is less than 90 percent of the minimum allowable wall thickness or the remaining wall thickness is less than 1·5 mm.

6.7 Line Corrosion

Cylinders having line corrosion shall be declared unserviceable when the line corrosion is 75 mm or more in length or wall thickness is less than 90 percent of the minimum allowable wall thickness.

6.8 General Corrosion

Cylinders having general corrosion shall be declared unserviceable when the area under general corrosion is having a wall thickness less than 90 percent of the minimum allowable wall thickness.

6.9 Gas Leak

When a leak is suspected, the cylinder shall be pressurized and submerged in a water-bath or soapy water shall be applied to the area of the suspected leak. Areas around the base shall be particularly checked. Cylinders leaking at a weld shall be submitted for repairs. If satisfactory repairs cannot be done, cylinders shall be declared unserviceable. Cylinders leaking in any other part of the body shall be declared unserviceable.

6.10 Fire

6.10.1 Cylinders shall be reheat-treated, hydrostatically tested and finished before being returned to service where:

a) paint is burned of,

b) bulging not exceeding the limit given in **6.1** has occurred, and

c) no other sign of excessive heat damage is evident.

6.10.2 Cylinders shall be declared unserviceable where:

a) warping or distortion has resulted,

b) bulging exceeding the limit given in **6.1** has occurred, or

c) other signs of excessive heat damage are evident.

6.11 Thread Inspection

Visual inspection of bung/valve pad threads shall be carried out. Cylinders having damaged threads shall be rendered unserviceable.

7 TARE WEIGHT VERIFICATION

After degassing and thorough cleaning, (internally and externally, according to **7.1** and **7.2**) cylinders shall be checked for correct determination of the tare weight (weight of the empty cylinder with valve, footring and valve protection device). Any cylinder having lost its tare weight shall be declared unserviceable.

7.1 External Cleaning

Each cylinder shall be cleaned externally by wire brushing water jet abrasive cleaning, suitable chemical cleaning or any other suitable method.

7.2 Internal Cleaning

Each cylinder shall be internally cleaned by any of the following methods.

7.2.1 Where the interior of the cylinder is contaminated by oil or other similar fluid it shall be cleaned by one of the following methods:

a) Steam cleaning

b) Washing out with a suitable solvent.

7.2.2 Where the interior of a cylinder is affected by rust or other foreign matter it shall be cleaned by one of the following methods:

a) Approved blasting, rotary wire brushing or rumbling procedure; or

b) Burn out treatment in a furnace at 300°C for a period not exceeding one hour after which all free rust and scale shall be removed by methods given in **7.2.1**.

7.2.3 *Internal Inspection*

The internal surface of the cylinder shall be examined by means of an extra low voltage inspection lamp and the cylinder shall be declared unserviceable if the defects specified in **3** are observed.

8 UNSERVICEABLE

Cylinders with any one or more of the following conditions shall be declared unserviceable:

a) Cylinders declared unserviceable when inspected according to **6** and **7.2.3**;

b) Cylinders having lost their identity (manufacturer's name, serial No. of the cylinder, test date and original tare weight);

c) The cylinders having wall thickness less than 90 percent of the minimum allowable thickness; and

d) The cylinders having lost their tare weight by over 5 percent of its original tare weight.

9 DESHAPING

Cylinders declared unserviceable during inspection shall be returned to the owner for proper deshaping or shall be deshaped by any of the methods specified in IS 9200 : 1988 under the supervision of inspecting authority as per owner's option.

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